

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

**0 009 993
A1**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 79302144.5

(22) Date of filing: 09.10.79

(51) Int. Cl.³: **D 06 N 7/00**
B 05 D 1/26, B 29 D 27/02
B 29 F 3/00, D 06 N 3/00

(30) Priority: 10.10.78 GB 3990978

(43) Date of publication of application:
16.04.80 Bulletin 80/8

(84) Designated Contracting States:
BE DE FR IT NL

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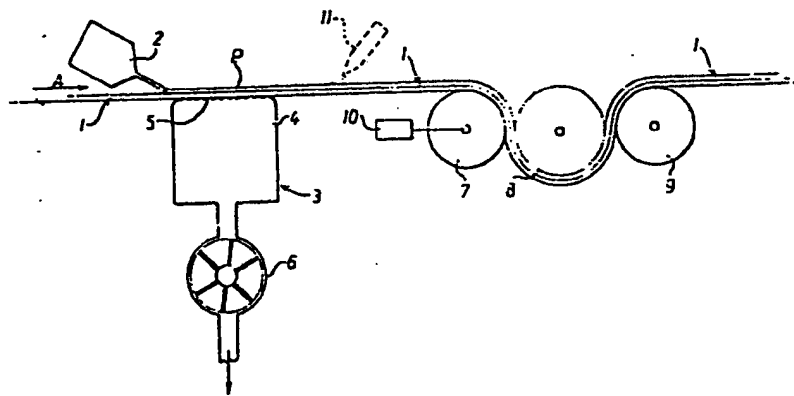
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(54) Improvements relating to methods and apparatus for plastic coating sheet material.

(57) The present specification discloses a method and apparatus for applying a coating of a plastics material to sheet-like material which is pervious to air, for example, the back of a carpet. Basically plastics material (P) is extruded onto the back of the carpet (1) and the carpet (1) is passed over suction means (3) which draws the plastic material (P) against and between the fibres of the carpet base (1). The composite (1,P) is then cooled to solidify the plastics material and bond the plastic to the carpet back (1).

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DESCRIPTION

"Improvements Relating To Methods And Apparatus
For Plastic Coating Sheet Material"

The present invention relates to a method and
5 apparatus for applying a coating of a plastics material
to a sheet-like material which is pervious to air.

Many types of sheet or film material can be
plastic-coated by passing them underneath an extrusion
die so that a film of molten plastic is spread over the
10 surface of the material being coated. Immediately after
the molten plastic is applied, the material passes
between a pair of nip rollers. Usually one roller is
rubber-covered and the other is a metal roller which has
water circulating therethrough to remove the heat from the
15 plastic. The pressure of the nip rollers ensures a
bonding of the plastic on to the other material.

If this known method is used for coating the back
of carpets of any type, certain problems arise. Firstly,
due to the sponginess of the carpet material, it is not
20 possible to get the plastics coating to adhere to the
back of the carpet without the nip rollers flattening
the pile on the carpet. Further, the plastics coating
tends to lie on the top of the fibres projecting from
the back of the carpet and a very poor bond is obtained
25 i.e., when the plastic has cooled it can be easily
peeled off.

The aim of the present invention is to provide
a method and apparatus which enables a plastics
coating to be satisfactorily bonded to the back of a
30 carpet without damaging the carpet or to any other sheet
material which is pervious to air e.g. filter paper or a
woven fabric.

According to the present invention there is
provided a method of applying a coating of a plastics
35 material to a sheet of material which is pervious to air,
comprising the steps of extruding molten plastics material

onto the sheet of material and passing the material over suction means to thereby draw the plastics material against the material.

According to a further aspect of the present invention there is provided a machine for applying a coating of a plastics material to a sheet of material which is pervious to air, said machine comprising an extrusion die for dispensing molten plastics material onto the sheet of material as it passes therebeneath, and suction means arranged beneath the path of the material for drawing the plastics material against the sheet of pervious material.

In a preferred embodiment of the present invention the suction means comprises a box, the top of which has a perforated metal grid with a polished surface, a vacuum fan being arranged to draw air through the grid into the box so that as the sheet material is passed over the box, air is drawn through the material. Preferably, the box with the material sliding over it, is placed directly beneath the extrusion die from which the molten plastics material flows. Thus the film of plastics material is drawn onto the material by the air flow, the pressure drop beneath the plastic material causing atmospheric pressure to force the plastics material in to all the crevices and pores formed in the material.

The plastics coating can be any extrudable thermoplastic material or a mixture of such thermoplastic material with a filler such as chalk, talc, wood flour, etc. Further the plastic coating material with or without a filler may contain a foaming agent which is activated in the plastic extruder machine or in the die so that the plastics coating may have sponge-like properties. This latter plastic coating is especially suited for backing carpets.

Preferably the sheet of material is passed beneath the extrusion die at a slightly faster speed

than that at which the plastic flows from the die, then by stretching the plastics material to provide a more even layer and creating a degree of orientation i.e. aligning the polymer molecules to a certain extent to thus
5 strengthen the coating. This may be facilitated by having the extrusion head angled so that the extruded plastics emerges from the die at an angle to the plane of the sheet material, the orifice of the die being in close proximity to the leading edge of the vacuum box.

10 After the extrusion die and suction box the material is preferably passed through a press nip with the plastics coating in contact with a water cooled roller to remove the heat from the plastic. Alternatively the plastics coating may be cooled by blowing a stream of air
15 or gas onto the plastic surface. This latter alternative is especially suited to sponge backed carpet wherein the sponge would be flattened by a cooled press nip.

When a carpet is backed utilising the present invention a very strong bond is formed between the
20 coating and the carpet, the plastics coating interlocking with the fibres in the back of the carpet. By varying the suction applied i.e. varying the effect of atmospheric pressure, it is possible to control the degree of penetration of the plastics coating into the carpet.

25 It has been found that carpets backed according to the present invention can be vacuum formed to form, for example, motor car carpets, door panels etc.

The present invention will now be further described, by way of example, with reference to the
30 accompanying drawing in which one embodiment of a machine according to the present invention for backing carpet, is diagrammatically illustrated.

In the embodiment of the present invention illustrated in the accompanying drawing the carpet is
35 moved along a generally horizontal path in the direction

of arrow A with its pile side down. The carpet passes through a first station comprising an extrusion die 2 and suction means 3. The suction means 3 comprises a vacuum box 4 which has a perforated uppermost wall 5 over which the carpet is drawn, the vacuum box 4 being connected to a suction pump 6. The suction pump 6 may take the form of an extraction fan. Directly above the suction means 3 is located extrusion die 2, the die 2 being arranged to dispense molten plastics material P onto the back of the carpet adjacent to the upstream end of perforated wall 5 taken in the direction of travel A. Thus downstream of extrusion die 2 the suction means 3 creates a low pressure region beneath the plastics material causing gravity and atmospheric pressure to force the plastics coating into the back of the carpet.

The plastic coating is preferably extruded at a slower speed than the speed at which the carpet passes the die 2, thereby stretching the plastics material and both providing a more even layer and creating a degree of orientation. This is facilitated by the die 2 being arranged so that the extruded plastics sheet is angled to the plane of the carpet at approximately 20° , the orifice of die 2 being in close proximity to the leading edge of the vacuum box 4. This preferred facility can be applied to the treatment of any other material within the scope of the present invention, with equal effect.

After this first station the carpet is passed through a second station comprising an adjustable, rubber-covered, nip roller 7, a water-cooled roller 8, and a guide roller 9. The carpet 1 passes through the nip formed by rollers 7 and 8, and continues around water cooled roller 8 which removes heat from the plastics coating P; the carpet being guided around roller 8 by virtue of roller 9. The pressure of this nip can be adjusted by varying the position of roller 7 by means of pneumatic ram 10. The carpet is then passed to a collection station (not illustrated) where it is wound ready for storage and future use.

Whilst in the illustrated embodiment the plastic coating is cooled by passing the carpet around a cooled roller, alternatively a stream or streams of cooling air or gas may be played onto the coating via, for example, nozzle 11 which is shown in dashed lines in the drawing. This latter cooling method is especially suited to carpets or other sheet material, when coated with a sponge-like plastics layer as referred to herebelow, wherein the press nip and roller arrangement 7,8,9, would flatten the foam.

The plastics coating used in the present invention can be any extrudable thermoplastic material or a mixture of such thermoplastic material with a filler such as chalk, talc, wood flour etc. Further, the plastic coating material with or without filler may contain a foaming agent which is activated in the plastic extruder machine or in the die so that the plastic coating may have sponge-like properties.

The present invention thus enables a plastic coating to be satisfactorily bonded to the back of a carpet without requiring any excessive pressure to be applied which might damage the carpet pile. Such carpets can be subsequently vacuum formed to provide moulded motor car carpets or door panels. In such an event cooling of the plastics material coating can be delayed to obviate the necessity for reheating.

CLAIMS

1. A method of applying a coating of a plastics material to a sheet of material which is pervious to air, comprising the steps of extruding molten plastics material (P) onto the sheet of material (1) and passing
5 the sheet of material over suction means (3) to thereby draw the plastics material (P) against the sheet of material (1).
2. A method as claimed in claim 1, when said sheet
10 of material (1) is a carpet, the plastics material (P) being applied to the back of the carpet.
3. A method as claimed in claim 1 or 2, characterised in that the sheet of material (1) is passed over the suction means (3) at a speed which is greater than
15 the speed at which the plastics material (P) is extruded onto said sheet of material (1).
4. A method as claimed in claim 1, 2 or 3, characterised in that the plastics material (P) is cooled after being passed over said suction means (3).
- 20 5. A method as claimed in claim 1, 2 or 3, characterised in that the sheet material (1) and plastics coating (P) are vacuum formed to a desired shape after passing over said suction means (3).
6. A method as claimed in any one of the
25 preceding claims, characterised in that the plastics material (P) is an extrudable thermoplastic material.
7. A method as claimed in claim 6, characterised in that the plastics material (P) incorporates a filler.
8. A method as claimed in claim 6 or 7,
30 characterised in that the plastics material (P) incorporates a foaming agent.
9. A machine for applying a coating of a plastics material to a sheet of material which is pervious to air, especially carpets, said machine comprising
35 an extrusion die (2) for dispensing molten plastics material (P) onto the sheet of material (1) as it passes

therebeneath, and suction means (3) arranged beneath the path of the material (1) for drawing the plastics material (P) against the sheet of pervious material (1).

10. A machine as claimed in claim 9,
5 characterised in that the extrusion die (2) is arranged so that the initially extruded plastics material makes an acute angle with the surface of said sheet of material (1).

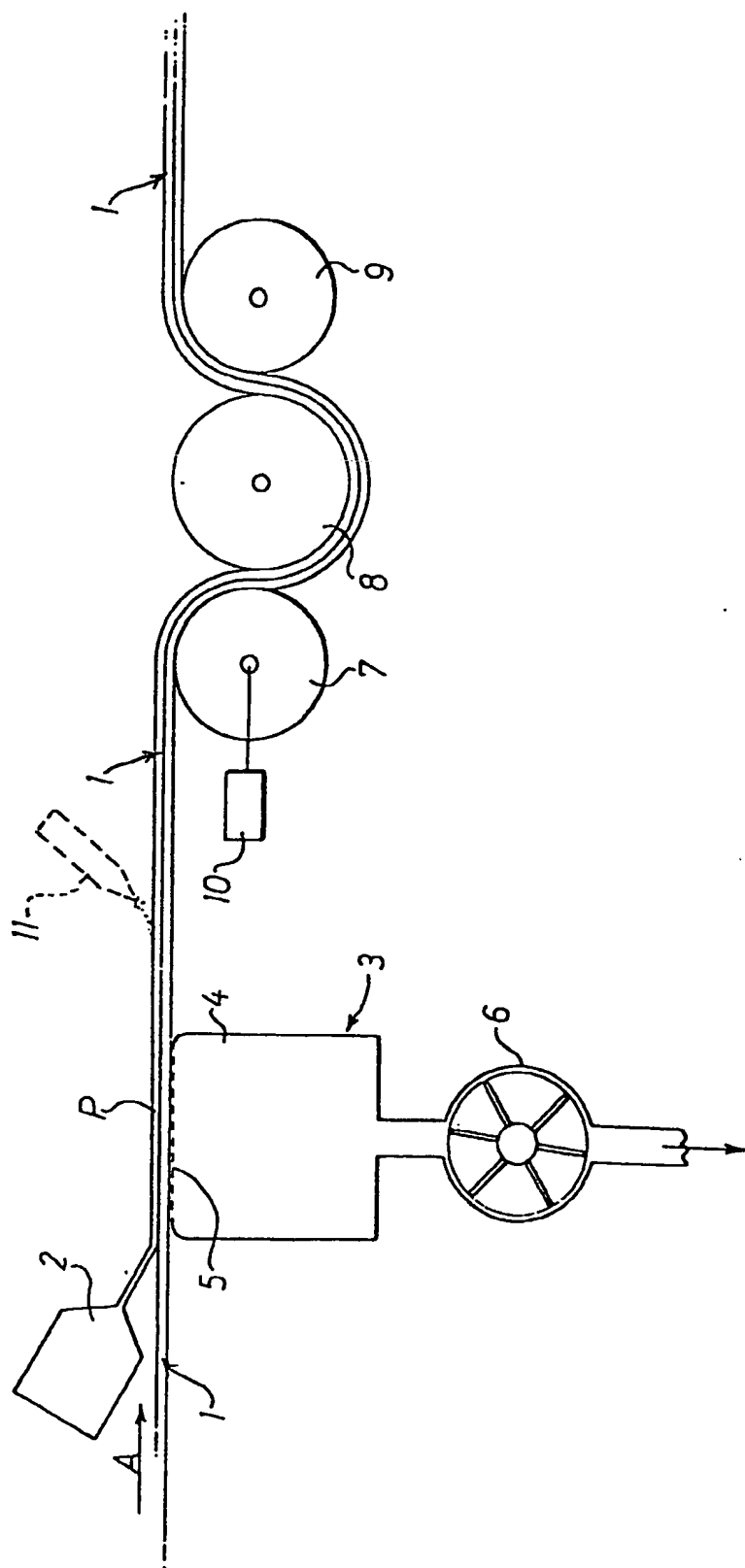
11. A machine as claimed in claim 9 or 10,
10 characterised in that said suction means (3) comprises a vacuum box (4) having a polished, perforated inlet surface (5) through which air is drawn by a fan (6), said sheet of material (1) being passed over said inlet surface (5) when the machine is in use.

12. A machine as claimed in claim 11,
15 characterised in that the extrusion die (2) is located near to the upstream edge of said inlet surface (5) of the vacuum box (4).

13. A machine as claimed in any one of claims 9
20 to 12, characterised in that cooling means (8,11) are provided downstream of said suction means (3) for cooling the plastics material (P) drawn against said sheet of material (1).

14. A machine as claimed in claim 13,
25 characterised in that said cooling means (8,11) is formed by a cooled roller (8), the sheet of material (1) and plastic coating (P) being passed around said cooled roller (8).

15. A machine as claimed in claim 13,
30 characterised in that a nozzle (11) for producing a stream of cooling gas, acts as the cooling means.





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EUROPEAN SEARCH REPORT

0009993
Application number

EP 79 30 2144

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<p><u>FR - A - 1 316 765</u> (BRITISH CELLOPHANE)</p> <p>* Page 1, right-hand column, 4th paragraph- end of column *</p> <p>--</p> <p><u>US - A - 3 843 760</u> (RICHARD K. TEED)</p> <p>* In particular figure 1, item no 45a; column 2, lines 45-60 *</p> <p>--</p>	<p>1,3,4, 6,7,9- 11,13, 15</p> <p>1,2,4</p>	<p>D 06 N 7/00 B 05 D 1/26 B 29 D 27/02 B 29 F 3/00 D 06 N 3/00</p>
A	<p><u>US - A - 3 418 198</u> (R.V. EINSTMAN)</p> <p>* Claims *</p> <p>--</p>	1,9	<p>TECHNICAL FIELDS SEARCHED (Int.Cl. 3)</p> <p>D 06 N 7/00 B 05 D 1/26 B 29 D 27/02 B 29 F 3/00 D 06 N 3/00 B 05 D 1/00</p>
A	<p><u>GB - A - 1 194 886</u> (GREENBANK)</p> <p>* Claims *</p> <p>----</p>	1,9	
			<p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons</p>
<p><input checked="" type="checkbox"/> The present search report has been drawn up for all claims</p>			<p>B: member of the same patent family, corresponding document</p>
Place of search		Date of completion of the search	Examiner
The Hague		14-01-1980	COUCKUYT